ABSTRACT OF THE DISCLOSURE

An improved analog optical system which provides improved dynamic range as well as sensitivity relative to known analog optical systems. The analog optical system includes a Mach-Zehnder modulator (MZM) operated with a low bias to improve sensitivity. In accordance with an important aspect of the invention, the optical system utilizes two optical wavelengths with two effective bias points to cancel even ordered distortion associated with low biasing. Two lasers having different wavelengths are applied to the Mach-Zehnder modulator by way of a wavelength division multiplexer (WDM). Alternately, a single laser producing two optical carriers having different wavelengths could be used in place of the two single wavelength lasers and the WDM. The modulator bias control circuit forces two optical carriers to two bias points on opposite sides of the minimum bias point thus, providing equal modulation depth with opposite sign on each of the two optical carriers. The frequency separation of the two optical carriers, together with the nominal optical path length difference between the two arms of the Mach-Zehnder modulator determines the degree of low biasing achieved and thus the resulting potential for improvement in sensitivity and third-order linearity. The receiver or demodulator also includes a WDM to separate the two wavelengths which, in turn, are applied to two separate photodetectors allowing each wavelength to be detected separately. The complementary photocurrents are subtracted with a balanced photodetector pair to provide a linearized RF output.